

Mr. Keith  
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# DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

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OFFICES  
ADMINISTRATIVE SERVICES OFFICE  
INFORMATION OFFICE

Ref. No. 2388

DIV. OF WATER &  
LAND DEVELOPMENT

August 8, 1986

DEPT. OF LAND  
& NATURAL RESOURCES  
STATE OF HAWAII

## MEMORANDUM

TO: The Honorable Susumu Ono, Chairman  
Board of Land and Natural Resources

FROM: Kent M. Keith *Kent M. Keith*

SUBJECT: Benefits for the Island of Hawaii Resulting from Geothermal Development

Recently Representative Andrew Levin asked me for an analysis of the benefits of geothermal development for the Big Island.

Attached for your information is the response prepared by my staff.

KMK/GOL:stk

Attachment



COPY

DEPARTMENT OF PLANNING  
AND ECONOMIC DEVELOPMENT

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August 4, 1986

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The Honorable Andrew Levin  
State Representative  
Thirteenth Legislature  
State Capitol, Room 432  
Honolulu, Hawaii 96813

Dear Representative Levin:

Thank you for your letter dated July 7, 1986, which asked for an analysis of the benefits of geothermal development for the Big Island, now and in the future, including but not limited to the jobs created.

In the attachments, we have tried to address, with information readily available, the actual or potential benefits for the Big Island resulting from the development of geothermal electricity at four stages: (a) the present 3MW; (b) a potential 50 MW for Big Island consumption; (c) a potential 500 MW for export; and (d) a potential 550 MW which combines (b) and (c).

We have not addressed the potential benefits from the direct, or non-electric, application of geothermal energy simply because we are unable to quantify what development might occur in this direction. However, we believe that there are sufficient geothermal by-products, especially heat in the geothermal fluids, to create small industries that could exceed the number of jobs created by the generation of electricity from the resource.

Very truly yours,

  
Kent M. Keith

KMK/GOL:1ta

Attachments

PRESENT GEOTHERMAL ECONOMICS ON ISLAND OF HAWAII

FY 1985-86

HGP-A Geothermal Wellhead Generator Operations and Maintenance

Actual Direct HELCO labor costs (5 jobs)	\$185,000
Actual HELCO labor-related wellhead	198,000
Actual Supplies and services purchased by HELCO locally	475,000*
Actual Security guards (3 jobs)	43,000
Actual Janitorial (1/2 job)	<u>6,000</u>
TOTAL	\$907,000

\*Total supplies and services purchased by HELCO was \$528,000.  
Assume 90% was spent within the Island of Hawaii.

Actual HGP-A/Puna Research Center Capital Improvements

Finish the construction of Puna Research Center	\$ 80,000
Design PRC improvements	\$ 45,000

Private Sector Estimates

Site Security and consultants: Puna Geothermal Venture	\$100,000
Permitting/public hearings: True/Mid-Pacific	\$100,000

## FUTURE GEOTHERMAL ECONOMICS ON ISLAND OF HAWAII

### Opening Statement

Shortly after the turn of the century, it is expected that 550 MW of geothermal electricity will be fully developed in the Puna District. Fifty megawatt of that capacity would be for the expected normal growth in Big Island electrical demand, and 500 MW would be primarily for export. Preliminary indications are that not all of the 500 MW could be exported during off-peak periods. Consequently, a DPED/DLNR study is about to begin to look into ways that some of the off-peak geothermal energy can be integrated with water resource development. One specific concept that will be investigated is to use off-peak geothermal energy to pump water from a wet area of the Island to an elevated reservoir, then release the water for uses in dry areas while generating power by hydroelectric means during on-peak periods. Since this study has not yet started, it is not possible to approximate the benefits, which are expected to be substantial, for the Big Island by integrating geothermal and water resource development.

It is assumed that geothermal energy in the Puna District will be developed as follows:

- 1989 - Add 12-1/2 MW for Big Island normal growth
- 1993 - Add 12-1/2 MW for Big Island normal growth
- 1995 to 2000 - Add 25 MW to replace Big Island oil-fired plants
- 1995 to 2005 - Add 500 MW for export

### 50 MW of Geothermal Power.

(The job and salary estimates are taken from Geothermal Power Development in Hawaii, Volume II, DPED, June 1982 with estimates expressed in 1981 dollars.)

### Jobs and Salaries.

At the peak of the 11 year development period, 205 people would be directly employed with total annual wages of \$4.6 million. Once the 50 MW is on line, 35 people with total annual wages of \$0.8 million would be needed to operate and maintain the geothermal fields and power plants. Twenty percent of the geothermal work force will earn under \$20,000, 70 percent will earn between \$20,000 and \$25,000, and 10 percent will earn over \$25,000 annually. The employment multiplier is 2.47, which indicates that for each direct geothermal job established, there will be another 1.47 jobs created in the service sector.

### Supplies and Services Purchased Within Island of Hawaii.

Use HGP-A actual ratio to arrive at \$2.05 million annually, after 50 MW is on line.

### Mineral Royalties.

The State Government claims ownership of the minerals. The State currently need not share mineral royalties with the local Government. Legislative action would be needed to require that the local governments share royalties. To encourage development, DLNR can waive royalties on a case-by-case basis for up to 8 years. Royalties are 10 percent of the value of the resource (steam), not electricity. Assume 50 MW at 85 percent of time and sold for \$.061/kwh, and that half of the electricity sales is for the steam. Royalties could total \$11.4 million annually.

### Property Tax.

Assume: four acres of leased land per MW; conservation and agriculture land valued at \$1,000 per acre with \$10 tax rate; County does not tax wells and pipelines; other capital improvements are \$1,000 per KW with \$8.50 tax rate. Property taxes would total about \$0.4 million annually.

### Income Tax and Excise Tax.

Not computed because these taxes accrue to the State, not the County.

### 500 MW of Geothermal Puna.

(The job and salary estimates are taken from Geothermal Power Development in Hawaii, Volume II, DPED, June 1982 with estimates expressed in 1981 dollars.)

### Jobs and Salaries.

At the peak of the 15 year development period, 485 people will be directly employed with annual wages totalling almost \$11 million. Once the 500 MW is on line, 185 people will be directly employed with total annual wages of about \$4.2 million to operate and maintain the geothermal fields and power plants. Twenty percent of the geothermal work force will earn under \$20,000, 70 percent will earn between \$20,000 and \$25,000, and 10 percent will earn over \$25,000 annually. The employment multiplier is 2.47, which indicates that for each direct geothermal job established, there will be another 1.47 jobs created in the service sector.

### Supplies and Services Purchased Within Island of Hawaii.

Multiply the 50 MW scenario by 10 to arrive at \$20.5 million.

### Mineral Royalties.

Multiply the 50 MW scenario by 10 to arrive at \$114 million annually.

### Property Tax.

Multiply the 50 MW scenario by 10 to arrive at \$4 million annually.



Income Tax and Excise Tax.

Not computed because these taxes accrue to the State, not the County.

550 MW of Geothermal Power.

It is probable that if 500 MW is developed primarily for export, there will still be a need for another 50 MW primarily to satisfy the normal growth in demand and replacement of oil-fired plants on the Big Island. This would result in a 550 MW scenario.

Each of the benefits to the Island of Hawaii in a 550 MW scenario can be arrived at by adding the 50 MW benefit to the 500 MW benefit with one exception. The peak employment during the 11 year development period for 50 MW would probably not occur at the same time as the peak employment during the 15 year development period for 500 MW, so the peak employment figures are not additive.